COOLING DEVICE, AND CHILLED GOODS SUPPORT THEREFOR

DESCRIPTION

[001] The present invention relates to a cooling device, especially a chilled goods support for such a cooling device.

[002] The temperature distribution in the interior of a cooling device is not homogeneous, which especially in cooling devices with an internal temperature above the freezing point, allows differently temperature-controlled areas of the interior to be used for different types of chilled goods which make different demands on the storage temperature. However, a specific usage of the temperature differences in the interior for this purpose assumes that the user knows, at least qualitatively, the temperatures prevailing in the different compartments of the interior. For this purpose, an interior configuration for a cooling device has been proposed in DE 102 05 589 A1 wherein a plurality of liquid crystal temperature displays are distributed on the different compartments of the interior of a cooling device to allow the user to optimally utilise the suitability of each individual compartment for storing different groups of chilled goods.

[003] These temperature displays can be placed in a compartment at different locations, it being dependent on a favourable choice of location whether the temperature detected by the display is representative for the compartment of the interior where it is attached. From the point of view of a representative temperature recording, it would be desirable per se to attach a temperature display in a compartment centrally between the heat sink, usually the rear wall of the interior chamber bearing the evaporator, and the main heat source, i.e. the door seal. For this purpose however, the temperature display would need to be attached to a side wall of the inner container and such a display would be difficult for a user to read. From the point of view of readability, attachment to the front edge of a chilled goods support, facing the door of the cooling device, is to be preferred. However, such a display is subjected to strong disturbing influences from warm air which penetrates into the interior when a user opens the door so that the temperature recorded and indicated by such a display is possibly no longer representative of the stationary state of the cooling device even after opening the door for a short time.

[004] In order to obviate this problem, it is proposed in DE 102 05 589 A1 that the heat-sensitive liquid crystals of such a liquid crystal temperature display should be held in contact with a thermal buffer accommodated in a housing of the display in order to thus impart a desired inertia to the display.

[005] It is the object of the present invention to provide a chilled goods support or a cooling device with such a chilled goods support which can achieve the advantages of the known interior configuration described above by simpler and more cost-effective means.

[006] The object is achieved by a chilled goods support having the features of claim 1 or a cooling device having the features of claim 9.

[007] Since, according to the invention, a supporting element of the chilled goods support is used as a thermal buffer for the liquid crystal temperature display, which supporting element generally has a not insignificant mass and therefore thermal capacity as a result of its function, it is superfluous for the temperature display to have its own thermal buffer so that space and costs can be saved.

[008] The thermal buffer is preferably formed by a frame moulded on a plate of the chilled goods support. The temperature display unit can be located directly on this frame on a side facing the door of the cooling device in the mounted state of the chilled goods support so this can be conveniently read by a user who has opened the door.

[009] In the interests of good readability, it is also preferable if the liquid crystal temperature display unit is attached to an outer side of the frame oriented obliquely to the plate, which points obliquely upwards in the mounted state.

[010] As a consequence of a first embodiment, a portion of the frame which supports the liquid crystal temperature display unit is an extruded profile which can be formed of plastic or metal.

[011] The liquid crystal temperature display unit can also be arranged on a frame which is moulded in one piece around the plate of the chilled goods support.

[012] In order to facilitate readability, the liquid crystal temperature display unit is divided into a plurality of discrete elements each having different colour change temperatures. Alternatively, a display zone of the liquid crystal temperature display unit can be provided wherein a transition zone is continuously movable between a low-temperature colour and a high-temperature colour depending on temperature so that a user can estimate the temperature from the location of the transition zone. In order to quantify the estimate, a scale can be constructed on the supporting element adjacent to the display zone.

[013] Further features and advantages of the present invention are obtained from the following description of the exemplary embodiments with reference to the appended figures. In the figures:

[014] Fig. 1 is perspective view of a cooling device according to the invention with the door open;

[015] Fig. 2 is a plan view of a first embodiment of a chilled goods support according to the invention;

[016] Fig. 3 is a partial plan view of a second embodiment of a chilled goods support;

[017] Fig. 4 is a partial plan view of a third embodiment of a chilled goods support;

[018] Fig. 5 is a section along the line V-V from Fig. 4;

[019] Fig. 6 is a partial plan view of a fourth embodiment of a chilled goods support; and

[020] Fig. 7 is a section through the chilled goods support from Fig. 6 along the line VII-VII.

[021] Figure 1 is a perspective view of a cooling device according to the invention with the door 7 open. The cooling device shown comprises a refrigerator-freezer combination with a chilled compartment 1 at the top and a freezing compartment 2 at the bottom. Although it can fundamentally also be applied to the freezing compartment 2, the invention is described hereinafter only with reference to the chilled compartment 1.

[022] The chilled compartment 1 is divided into a plurality of part compartments of regions 5, 5' by chilled goods supports 4 suspended on the side walls 3 of the housing. The two lowest regions 5' are each defined by a pull-out box 18, the regions 5 located thereabove are open towards the door 7. They are cooled by an evaporator located behind the rear wall 6 of the chilled compartment 1 at the height of region 5 which is not visible in the figure. In each of these regions 5 there exists a non-vanishing temperature gradient from a coldest point on the rear wall 6 to a warmest point near the door 7. Since the cold air in the chilled compartment 1 tends to sink, the lower-lying regions 5 are generally colder than the higher ones, i.e. the global temperature difference between the warmest and the coldest point of the entire chilled compartment 1 is greater than the temperature differences existing in the individual regions 5.

[023] A group of comparatively warm regions 5" is formed by box-shaped door compartments 8 mounted on the inside of the door 7 as chilled goods supports.

[024] Each region 5 is allocated respectively one liquid crystal temperature display unit 9 which is arranged at the front edge of a frame of that compartment base 4 which terminates the relevant region 5 at the bottom. The temperature display 9 is therefore closely adjacent to the region located thereunder but the temperature to which it is exposed is representative of the region located above the compartment base 4 since when the door is closed, cold air from the relevant region flows downwards over the front edge of the compartment base.

[025] Figure 2 shows a plan view of a compartment base 4 as a first exemplary embodiment for a chilled goods support according to the invention. The compartment base is substantially constructed of a plate 10 made of safety glass having a frame 11 made of plastic injection moulded on in one piece around its circumference. In each case, a web 12 and a pin 13 project in a manner known per se from the lateral flanks of the frame 11, which serve to support the

compartment base in grooves on the side walls 3 of the chilled compartment so that it can be withdrawn. A front edge 14 of the frame 11 facing the door is sloping similar to a desk, where a liquid crystal temperature display unit 9 is attached to the sloping surface 15 of the front edge 14. In this embodiment the display 9 is divided by webs 16 into a plurality of fields 17, each being enclosed between two films and having a liquid crystal composition with a different colour transition temperature. Usually temperature-sensitive liquid crystal compositions appear green at their transition temperature, reddish thereunder and blue thereover. A user can determine the temperature of a region at a glance from the position of the green field 17 in the arrangement of the display 9 or from the number of reddish or blue fields and from this can rapidly identify the suitability of a region for storing a certain type of chilled goods such as vegetables, milk products or meat goods.

[026] Figure 4 shows a plan view of a second embodiment of a compartment base 4 where the temperature display 9 has a continuous display zone whose liquid crystal composition varies from left to right so that, depending on the temperature to which the display is exposed, a boundary 19 between the blue and reddish region moves continuously over the display zone with temperature. Since in this embodiment, the display zone is not divided into individual fields, a user cannot easily deduce the temperature or the suitability of a region 5 for a certain type of chilled goods from the number of fields in a certain colour; instead, the frame 11 is provided with a row of reference marks 20 next to the temperature display 9 so that a user can determine the suitability of the relevant region for a certain cooling device from the position of the boundary 19 in relation to reference marks 20.

[027] Naturally, as shown in Fig. 4, the temperature display 9 can also be provided with a scale, for example in the form of numeral-shaped windows 21 in a non-transparent cover layer through which the liquid crystal material is visible and which allow a user to quantitatively read off the temperature of the relevant region 5.

[028] Figure 5 shows a schematic section through the front edge 14 of the frame 11 and the glass plate 10 enclosed thereby along the line V-V from Fig. 4, where it is understood that a corresponding section in the embodiments in Figs. 2 and 3 could have the same shape. The front edge 14 which is moulded onto the glass plate 10 encloses this in a closed material

fashion. The temperature display 9 is let into an indentation 22 on the upwardly sloping surface 15 of the front edge 14. It is attached to the inner side of a rigid disk 23, e.g. made of transparent plastic, which is enclosed in the material by moulding with the material of the frame 11 along its edges, thus holding the display 9 securely and protected.

[029] Figures 6 and 7 show a fourth embodiment of a compartment base 4 in a partial plan view or in a section along the line VII-VII from Fig. 6. As in the case in Fig. 2, the compartment base has a glass plate 10 which in the present case is not moulded with a frame but an extruded profile is placed on its front and rear (not shown) edges as a frame element. The profile forming the front edge 14 has a groove 24 on its rear side facing the glass plate 10, into which the glass plate 10 is inserted, wherein a rubber or foam-material strip 25 which is affixed to a lower leg 26 of the front edge 14 bordering the groove 24, is elastically compressed so that it presses the upper side of the glass plate 10 flat against the opposite side of the upper leg 27. The large-area contact allows good heat transfer between the glass plate 10 and the front edge 14 so that the glass plate 10 can also serve as a thermal buffer for the liquid crystal temperature display unit 9 which is glued to the sloping surface 15 of the front edge 14.

[030] In this fourth exemplary embodiment the temperature display 9 is the same as in the third exemplary embodiment since it is comparatively laborious to construct features such as the webs 12 or the reference marks 20 which make it easier to read the display 9 in an extruded profile.